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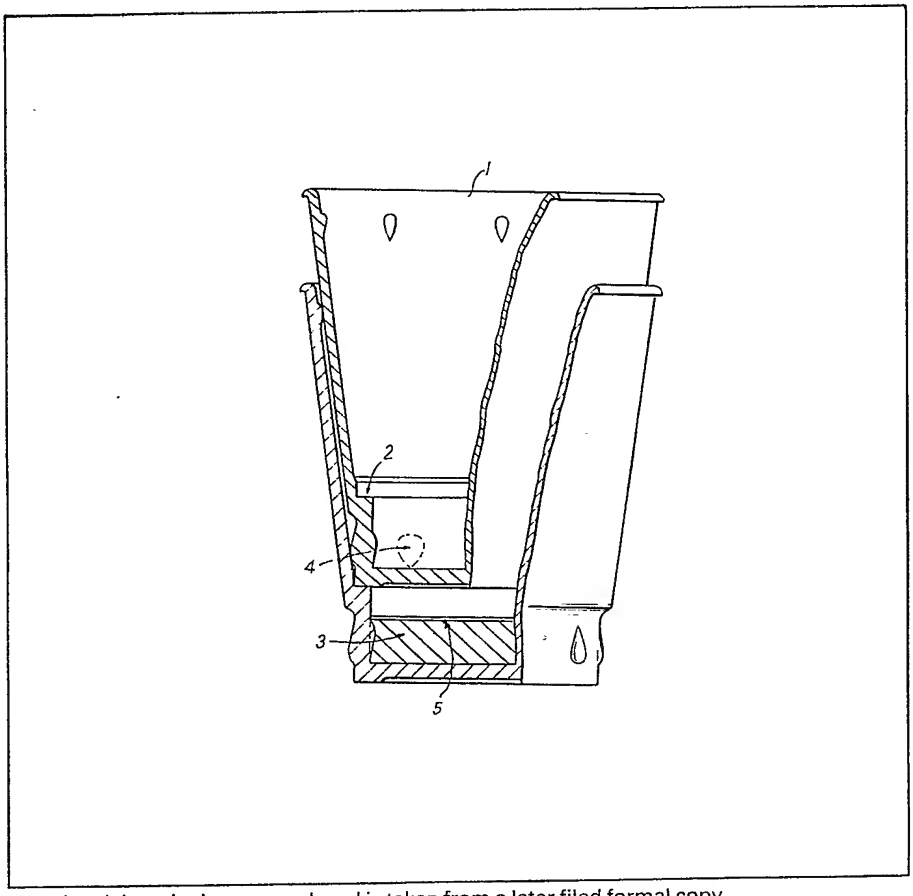
(54) **Storage of beverage concentrate**

(57) A measured dose (3) of a particulate beverage concentrate such as freeze dried instant coffee crystals is provided within a cup (1) in the form of a readily soluble integral and coherent mass, by dispensing particles of selected size into the cup, compressing the particles, preferably under the application of heat, and then spraying the exposed surface with a small quantity of a solution of a film forming substance which penetrates between the interstices of a superficial layer of said particles to form a protective crust or skin (5). The mass of particles may be interlocked with the cup by engagement with projections (4).



The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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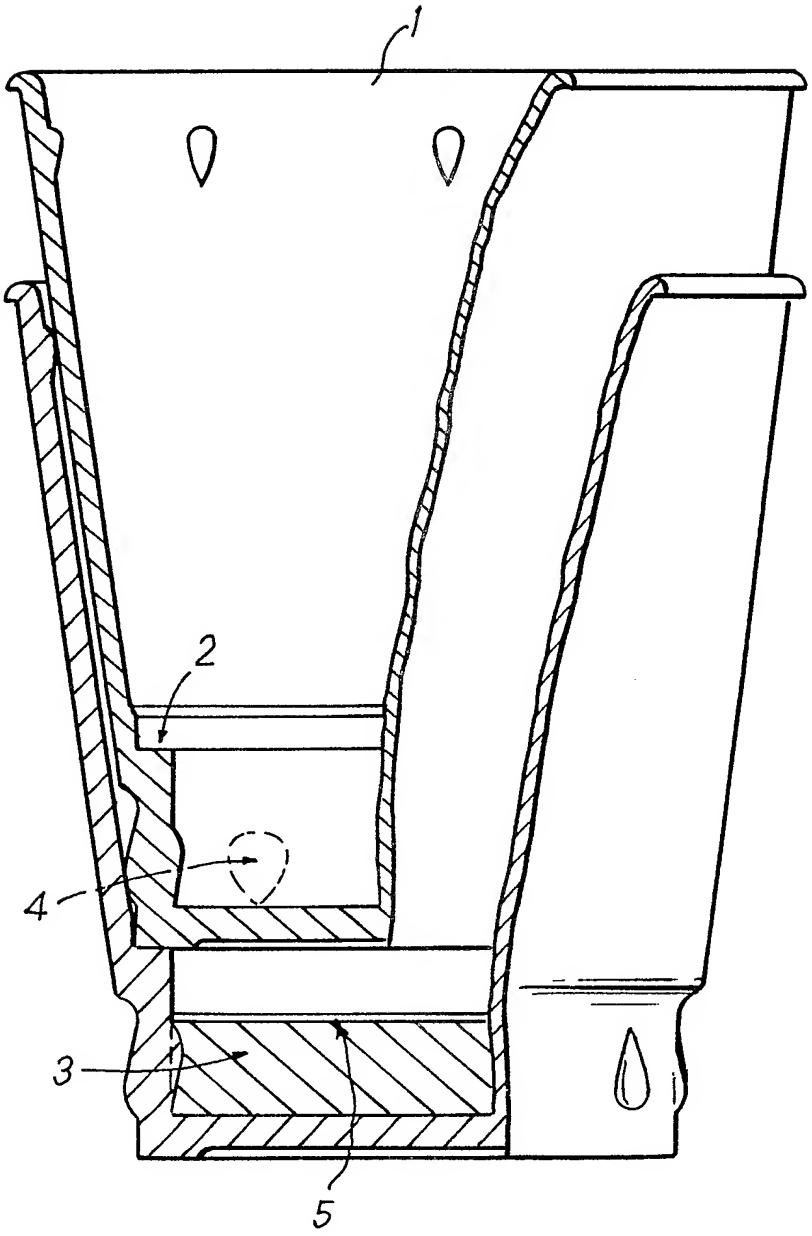
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SPECIFICATION

Improvements in and relating to the storage of beverage concentrate

This invention concerns improvements in and relating to the storage of beverage concentrate, and more especially to the storage of individual measured doses of beverage concentrate within containers in which the final beverage is to be prepared.

In order to enable the convenient dispensing of instant beverages, it has previously been proposed to provide a separate dose of beverage concentrate in each of a plurality of stacked disposable vending cups. The concentrate is stored in powdered or granular form in each cup, and although this reduces the labour involved in dispensing instant beverages and provides portion control, it has the disadvantage that the stacks of cups can become soiled during storage and service, by leakage of the powdered concentrate. In order to avoid the disadvantages of a loose granular beverage concentrate, it has also been proposed to store such beverage concentrate in individual cups in the form of tablets or wafers. This, however, has the disadvantage that the solubility of the concentrate is reduced when prepared in tablet or wafer form, thus reducing the acceptability of the product to the consumer.

In order to avoid the disadvantages of the loose particulate concentrate, whilst retaining improved solubility, it has further been proposed to form a particulate concentrate into a coherent mass by compressing the concentrate after it has been dispensed into the cup, so that it is retained within the cup as a compressed, semiporous coherent mass.

Although it has proved possible, particularly in the case of concentrates, such as freeze dried coffee, or agglomerated spray dried coffee, which have a relatively large particle size, to form a coherent mass which retains sufficient porosity to be readily soluble, the disadvantages associated with a loose particulate concentrate are not entirely eliminated.

Another prior proposal for the packaging of particulate doses of beverage concentrate within a cup comprises the application over a loose granular or powdered concentrate of a barrier film of a water soluble edible film forming substance such as gelatin. Such an arrangement has not, however, proved commercially successful, presumably due to the difficulty of applying sufficiently retentive but readily soluble film over a loose powdered product without deterioration in the quality or solubility of the product.

In accordance with the present there is provided a method of packaging a beverage concentrate, wherein said concentrate is prepared in the form of a particulate product of which the particles are of relatively large size, as defined herein, particles of said concentrate are dispensed into a container and are compressed, to form a coherent, semi-porous mass, and the exposed surface of the concentrate is then sprayed with a solution of a warm soluble edible film forming substance in an amount sufficient only to cause fusion of a superficial layer of said particles of concentrate into a thin crust or skin forming a barrier layer overlying the mass of said concentrate in order to maintain the integrity of the latter.

It has been found that a beverage concentrate formed in accordance with the invention can be retained in a measured dose within a container such as a vending cup within which it is ultimately to be dissolved to form the beverage, without substantial deterioration or loss of integrity of the product. The water-soluble barrier layer effectively protects the mass of concentrate against breaking up and becoming displaced within the cup, whilst acceptable solubility of the compressed granular product is maintained. Moreover, the superficial barrier layer may also serve to prevent oxidation of the beverage concentrate or other deterioration due, for example, to ingress of moisture or loss of aroma of a coffee product.

It is believed that the fact that acceptable solubility is obtained from a product in the form of an integral mass is due to appropriate selection of parameters such as the particle size of the product to be compressed and the volume of film forming liquid applied to the surface of the compressed product per unit area. It has been found that particles having a size which is relatively large in relation to the conventional spray dried coffee powder, for example such as freeze dried coffee crystals or agglomerated powder particles, are particularly suitable and by the term "relatively large size" as used herein in relation to particles of concentrate are meant particles of a size corresponding to such crystals or agglomerated powder particles. The volume of film forming liquid employed should be such as to cause formation of a crust or skin from the particles of concentrate by penetration of the liquid into the interstices between particles of a superficial layer of the concentrate, rather than by formation of a layer of the film forming substance alone. Too great a volume of liquid merely causes the particles of concentrate to dissolve into a toffee-like mass which is difficulty soluble.

Selection of the nature of the concentrate may also be important and in this respect it has been found that freeze dried instant coffee crystals are particularly suitable as the said particles of concentrate.

Preferably, the compression of the particulate concentrate into a coherent mass is effected by means of a shaped plunger heated to an elevated temperature, for example in the region of 100°C.

The barrier layer is preferably formed by spraying sodium alginate in a solution of water and alchohol. For example, a solution of 5% solid content sodium alginate in up to 30% alcohol with the balance water has been found to provide an effective superficial layer without penetrating the compressed concentrate to such an extent as substantially to reduce its solubility in water.

A beverage concentrate prepared in accordance with the invention may, for example, be stored within the base of a drinking cup of the type adapted to be nested in a stack of identical cups, the concentrate being retained within the cup by interlocking with recesses or projections provided in the

base thereof and the cup being so shaped that when identical cups are stacked one within the other the base of each stacked cup is supported out of contact with the mass of beverage concentrate contained in the cup below. Such a cup may, for example, be formed from expanded polystyrene, in respect of which the soiling of cups by loose particulate beverage concentrate stored therein has previously posed a considerable problem. Advantageously, such a cup may incorporate a stacking ledge adjacent the base wall and above the level of the mass of stored concentrate, so that the base of an identical upper cup when resting upon said stacking ledge encloses a space within which the said mass of concentrate is retained.

The invention is illustrated by way of example in the accompanying drawing, the single figure of which is a side elevation of two cups formed of moulded expanded polystyrene, shown in stacked relationship and partly in section to illustrate the storage of beverage concentrate therein.

Referring to the drawing, there are shown two cups formed from moulded expanded polystyrene, which are constructed so that identical cups 1 can be stacked one within the other, the base of one cup resting upon a stacking ledge 2 within, and adjacent the base of the cup below, in known manner. Within the base of the lower cup is provided a mass 3 of semi-porous beverage concentrate which is formed of particulate material compressed to form a coherent body which interlocks with half pear-shaped protrusions 4 arranged around the inner wall of the cup at the base, below the stacking ledge. The protrusions 4 can be seen more clearly in the upper cup from which the mass of concentrate 3 has been omitted for clarity. The formation of the mass of beverage concentrate 3 into a coherent body is achieved by placing the beverage concentrate within the cup in the form of a particulate or granular product, and then compressing the product by means of a shaped, heated mandrel. The appropriate temperature and pressure of application of the mandrel may be determined by experiment in accordance with the granular product to be compressed and should be sufficient to produce a compact semi-porous coherent mass without tabletting the product to the extent that its solubility is substantially reduced. In the case of a freeze dried granulated instant coffee product, for example, heating of the plunger to 100°C has been found sufficient to cause agglutination of the granular particles without undue consolidation of the mass. Rotation of the plunger during the compression serves to prevent adherance of the particles thereto. In cases where the particles become insufficiently self-adhesive the addition of 0.5% by weight of a food quality gum such as acacia gum or gum tragacanth may be of assistance.

The exposed surface of the mass 3 of beverage concentrate is then covered with a barrier layer 5 of a water-soluble film-forming material, which serves both to maintain the integrity of the coherent mass and also to protect it against deterioration by oxidation in contact with atmosphere. The barrier layer 5 is formed by spraying the coherent mass 3 of concentrate with a solution of sodium alginate. The mass of material 3 is maintained out of contact with the base of the upper cup, as illustrated in the drawing, due to the engagement of the upper cup upon the stacking ledge 2.

The invention is further illustrated in the following Example.

Example

In the preparation of a cup/beverage concentrate combination as illustrated in the drawing, 1.9 grams of Nescafe Gold Blend brand granular instant coffee was dispensed into the base of a standard 8 ounce vending cup formed of moulded expanded polystyrene. The granular coffee was then compressed to form a semi-porous coherent product by means of a shaped plunger heated to 100°C. The plunger was rotated during compression to prevent adhesion of the product thereto.

After removal of the plunger from the cup the exposed surface of the compressed coffee product was then sprayed with approximately .25 cc of a solution of sodium alginate having the following composition:

sodium alginate solid	: 5% by weight
alcohol	: 30% by weight
water	: 65% by weight

In use it was found that a plurality of stacked cups containing stored beverage concentrate prepared as described above could be handled and transported under normal conditions without loss of integrity of the stored product, and without unacceptable soiling of the bases of the stacked expanded polystyrene cups by coffee powder. The stored concentrate was also found to have acceptable solubility in boiling water when dispensed into the cups.

CLAIMS

1. A method of packaging a beverage concentrate, wherein said concentrate is prepared in the form of a particulate product of which the particles are of relatively large size, as defined herein, particles of said concentrate are dispensed into a container and are compressed to form a coherent, semi-porous mass, and the exposed surface of the concentrate is then sprayed with a solution of a water soluble edible film forming substance in an amount sufficient only to cause fusion of a superficial layer of said particles of concentrate into a thin crust or skin forming a barrier layer overlying the mass of said concentrate in order to maintain the integrity of the latter.

2. A method as claimed in Claim 1, wherein said beverage concentrate is a coffee concentrate and the said particulate product is formed by the freeze drying process.

3. A method as claimed in Claim 1, wherein said beverage concentrate is a coffee concentrate and the particulate product is formed by the spray drying process, with subsequent agglomeration of the dried powder particles.

4. A method as claimed in any one of Claims 1 -

3, wherein said particles are compressed to form said coherent mass by means of a plunger heated to an elevated temperature.

5. A method as claimed in Claim 4, wherein said plunger is heated to approximately 100°C.

6. A method as claimed in any one of Claims 1 - 5, wherein said film forming substance comprises a solution of sodium alginate.

7. A method as claimed in Claim 6, wherein said solution comprises 5% solid content sodium alginate, and up to 30% alcohol, with the balance being water, said percentages being by weight.

8. A method as claimed in Claim 1, substantially as described herein.

9. A container provided with a packaged dose of beverage concentrate, substantially as described herein with reference to the accompanying drawings.

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